



The Danish Test Facilities – Megavind Offspring

Madsen, Peter Hauge; Jensen, Peter Hjuler

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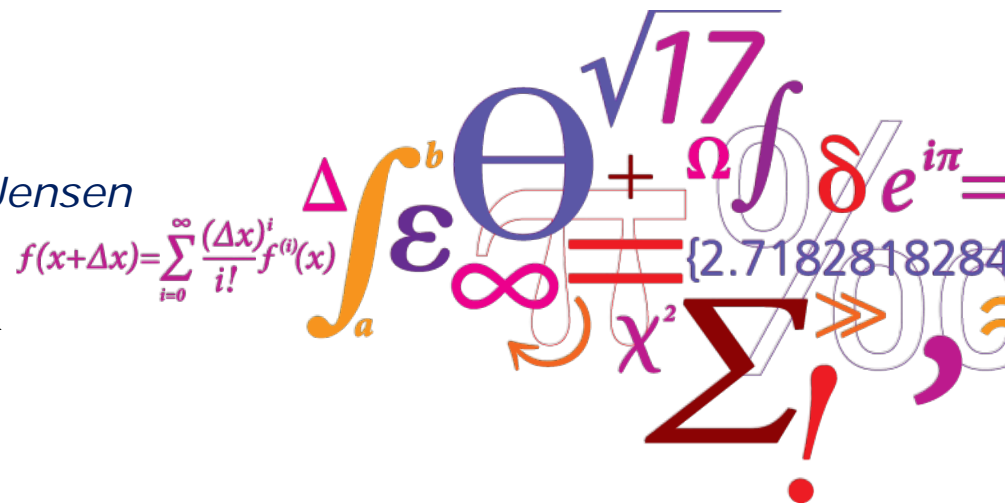
The Danish Test Facilities – Megavind Offspring

DTU Wind Energy

Peter Hauge Madsen & *Peter Hjuler Jensen*

Department of Wind Energy

The Technical University of Denmark

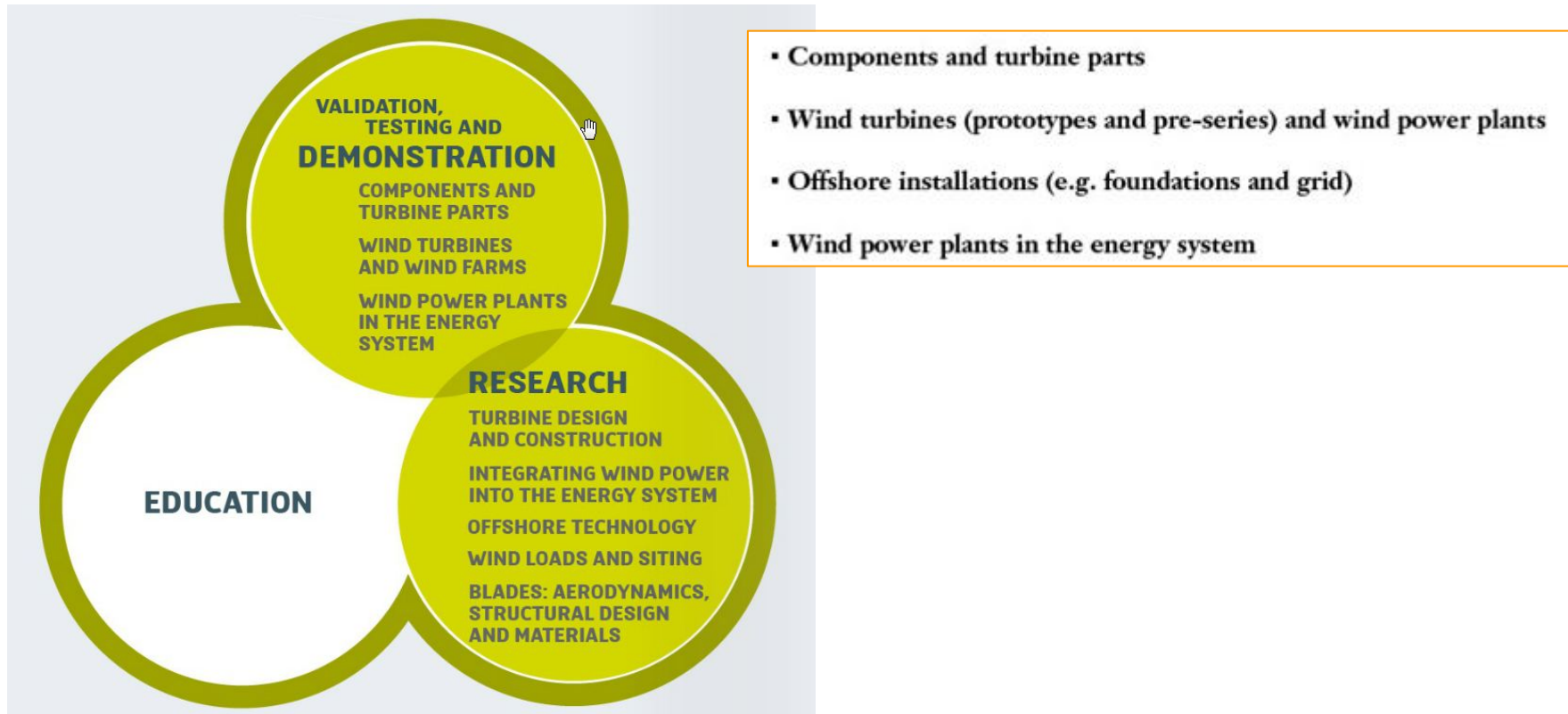


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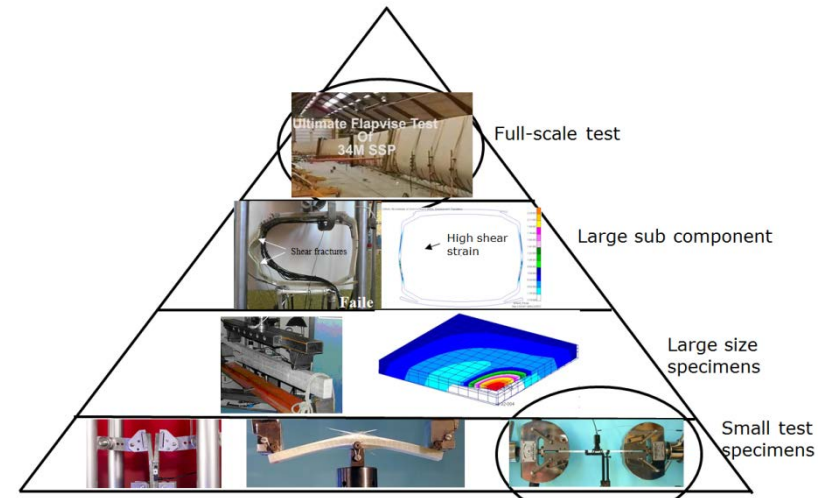
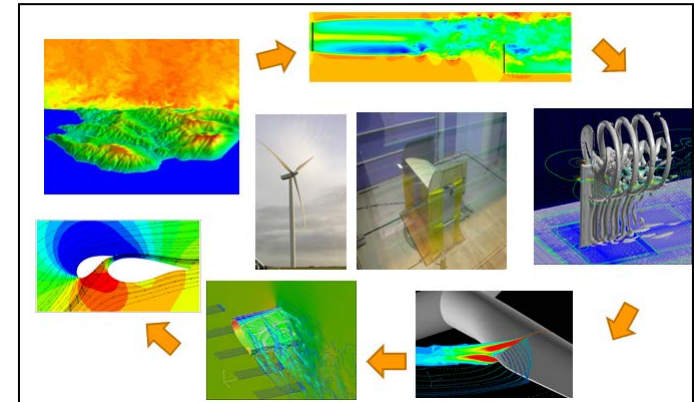
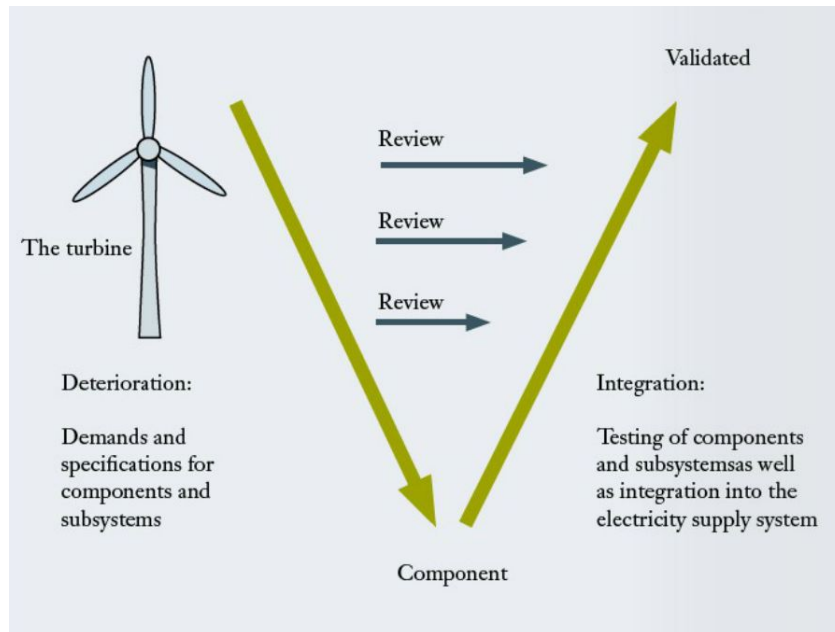
Department of Wind Energy



Megavind 2007 - 2013



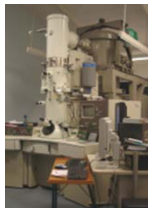
Validation – Products and research



Survey of test and research infrastructures

- **Existing and pipeline**

- Testcenter Østerild and Test Center for Large Wind Turbines at Høvsøre, DTU Wind Energy
- Blaest blade test facility and DTU Wind Energy static blade test facility
- LORC test facilities and DTU Wind Energy Drivetrain Test Facility
- Wind tunnel, DTU Wind Energy
- Grid test facility on Testcenter Østerild, DTU Wind Energy
- Computer Clusters, DTU Wind Energy
- Material and component tests (Hydraulic test bench – microscopes), DTU



- **Need for new research infrastructures, DTU**

- Research wind turbine Fatigue research blade test facility
- Research (acoustic) wind tunnel instrumentation
- Offshore wind conditions test equipment
- FiberLab (scale models, prototype components)



- **Need for new industry infrastructures**

- **More test sites** (Low wind, cold/warm climate, complex flows, duration)



DTU Test Stations – Prototype Testing



5 test beds
 < 165 m
 < 8 MW
 Spacing 300 m

7 test beds
 < 250 m
 < 16 MW
 Spacing 600 m



Wind Turbines at Østerild

Stand (no)	Turbine Company (model)	Effect (MW)	Diameter (m)	Nac / Tip height (m)
1	www.WindTurbineTest.com		Tender:	28/6-2013
2	Vestas (in 2014)			
3	Vestas (in 2013)			
4	www.WindTurbineTest.com		Tender:	28/6-2013
5	Envision (in 2014)			
6	Siemens (SWT-6,0)	6,0	154	120 / 197
7	Siemens (SWT-4,0)	4,0	120	110 / 170

Østerild Test Center

Wind turbine testing:

- Tests acc. to international standards (IEC)
- Development tests

Research:

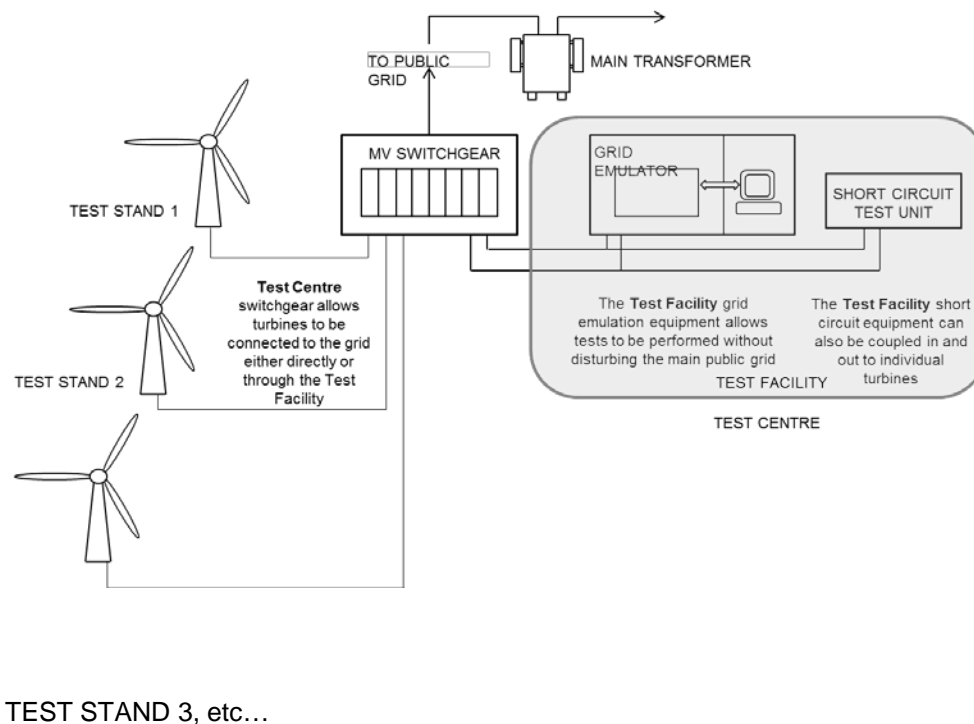
- Meteorology (Wind)
- Turbine technology
- Grid integration



Inauguration 6. Oct. 2012

The DTU Wind Energy Moveable Grid Test Facility: Overall schematic

Test facility supports test of wind turbines with rated power $P_n < 10\text{MW}$. Two types of equipment included in the Test Facility:

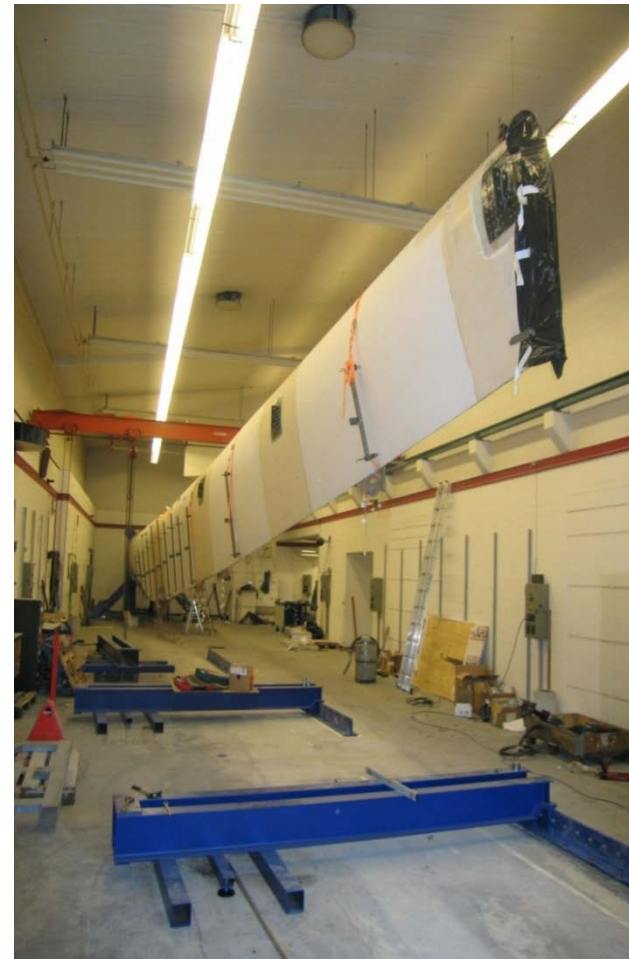


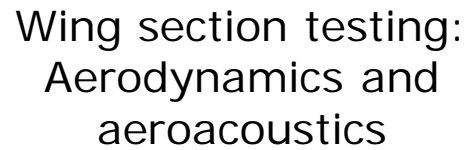
- 1) Short circuit equipment
 - only applicable to LVRT tests,
 - required by most TSOs today
- 2) Power converter equipment
 - net emulation which enables tests of wind turbine response to a variety of grid conditions, including system services like primary frequency control and virtual inertia

Blaest Blade test facility and DTU Wind Energy Blade Test Facility

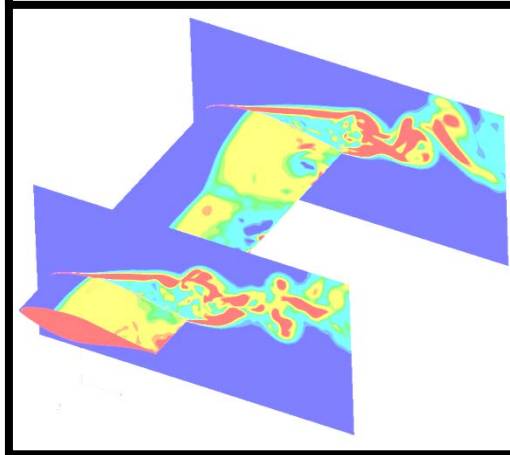
DTU Wind Energy

Blaest

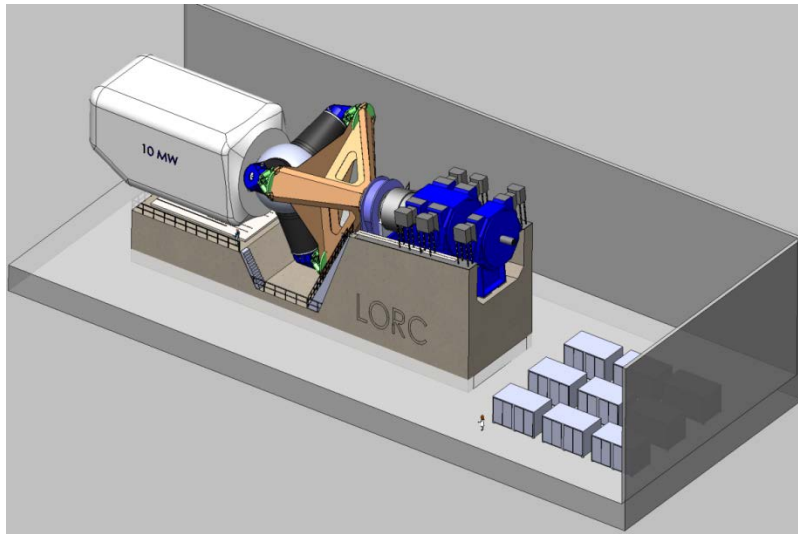




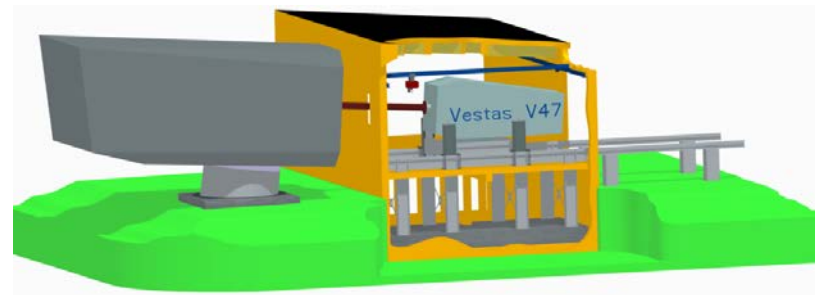
A 3D perspective view of the test section layout. The layout shows a rectangular area divided into sections. A red arrow points from the 'Workshop 3' area towards the 'Test section'. The 'Test section' is a rectangular area in the center. The 'Far' area is at the top right. The 'Workshop 1' area is at the bottom right. The 'Workshop 2' area is at the bottom left. The 'Workshop 3' area is at the top left.



Drivetrain test facilities at LORC and DTU Wind Energy



DTU Wind Energy

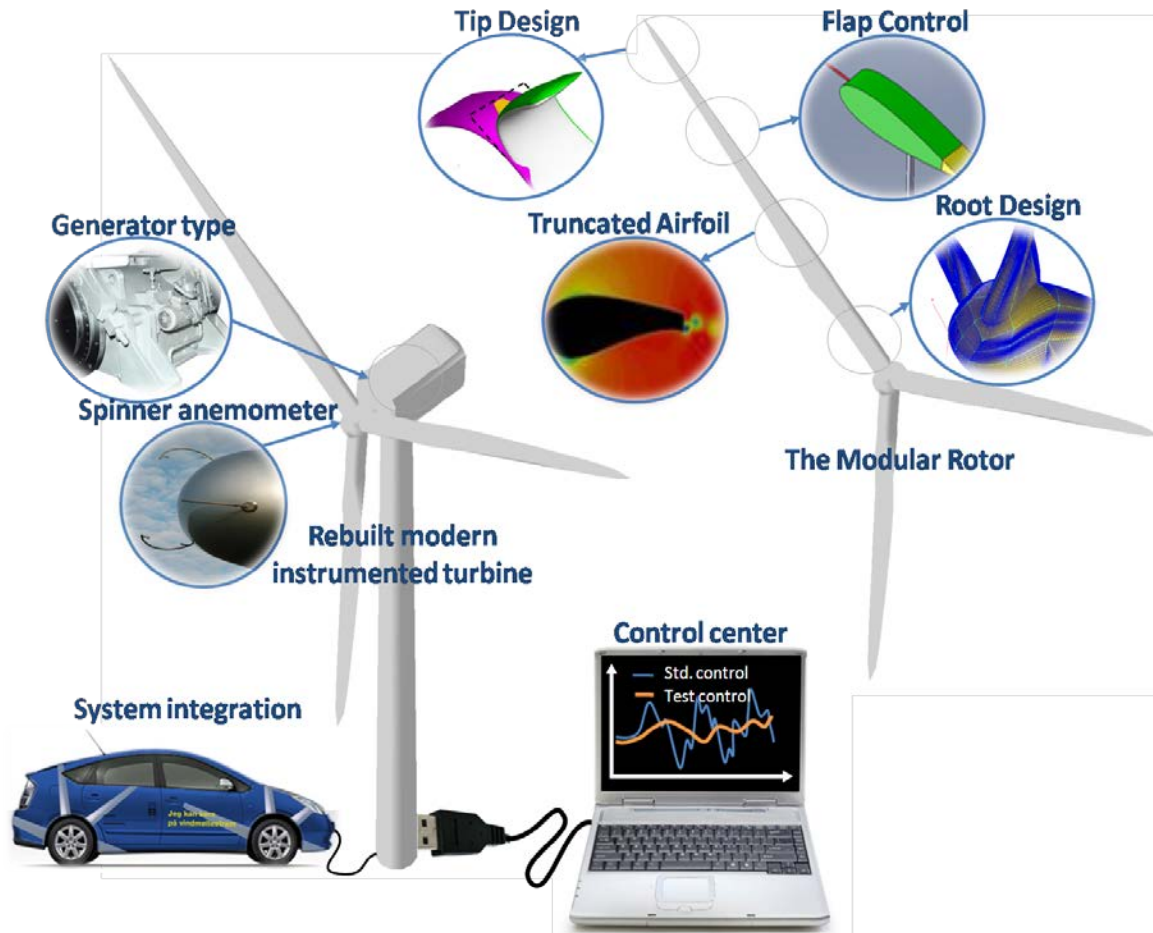


Need for research infrastructures at DTU Wind Energy



- Research wind turbine at DTU wind energy**
- Fatigue research blade test facility**
- Research instrumentation of new Wind tunnel**
- Offshore wind conditions test equipment**
- FiberLab**

Research Wind Turbine, DTU Wind Energy





Thank you for your attention